less be found to be diacid, like the diamines derived from ethylene. Even now the group of diacid diamines is represented in the naphtyl-series:

$$\text{Naphtylamine} \quad \left.\begin{matrix} C_{10}H_7 \\ H \\ H \end{matrix}\right\} N \text{ monoacid.}$$

$$\text{Naphtylenediamine} \quad \left.\begin{matrix} (C_{10}H_6)'' \\ H_2 \\ H_2 \end{matrix}\right\} N \text{ diacid.}$$

The body which I designate by the term Naphtylenediamine, is the base which Zinin obtained by the final action of sulphide of ammonium upon dinitronaphtaline. This substance, originally designated seminaphtalidam, and subsequently described as naphtalidine, combines, according to Zinin's experiments, with 2 equivalents of hydrochloric acid*.

II. "On the Formula investigated by Dr. BRINKLEY for the general Term in the Development of LAGRANGE'S Expression for the Summation of Series and for successive Integration." By Sir J. F. W. HERSCHEL, Bart., F.R.S. &c. Received April 26, 1860.

(Abstract.)

In the Philosophical Transactions for the year 1807, Dr. Brinkley has investigated an expression of the general term of the series of Lagrange and Laplace for the finite differences and integrals of any function u in terms of its differential coefficients and common integrals of successive orders *ad infinitum*, which is in effect equivalent to the development of the functions $(e^t-1)^n$ and $(e^t-1)^{-n}$ in powers of t. The demonstration of the formulæ arrived at, as there stated, is circuitous and extremely difficult to follow; so much so as to render a simpler and easier one a desideratum in analysis, as there are probably few who have had the patience to follow it out to its conclusion.

More recently (Philosophical Transactions, 1816), the author of the present paper arrived at a general and extremely simple expression

* Liebig's Annalen, vol. lxxxv. p. 328.

for the coefficient of t^n in the development of any function of e^t such as $f(e^t)$, in which are included, as particular cases, the two functions treated in Dr. Brinkley's paper. In the case of $(e^t-1)^n$, n being positive, the development so obtained agreed in form with that arrived at by Brinkley, and before him by Professor Ivory; but in that of $(e^t-1)^{-n}$ it differs from Brinkley's totally in point of form (though affording, of course, the same numerical results), being much simpler in expression and far more easily reduced to numbers. Neither was it at all apparent by what mode of transformation it was possible to pass from one form to the other; and this has ever since remained a difficulty.

The essential difference between the two forms is, that in the general coefficient, as expressed by Brinkley, the progression of terms of which it consists are multiplied respectively by the successive differences of zero,

$$\Delta 0^{x+1}, \quad \Delta^2 0^{x+2}, \quad \Delta^3 0^{x+3}, \text{ \&c.},$$

which run out in a diverging progression to infinity; so that the number of terms of which the coefficient consists is limited, not by this progression coming to an end *per se*, but by relations of another kind; whereas in the coefficient resulting from the other mode of treatment, the differences of zero involved form the progression

$$\Delta 0^x, \quad \Delta^2 0^x, \ldots\ldots \Delta^x 0^x,$$

which terminates *per se* at its xth term. A theorem subsequently demonstrated by the author of this paper, however, in his "Collection of Examples in the Calculus of Finite Differences," affords the means of expressing any term in the former progression by a series of terms belonging to the latter. By substituting, then, the values so obtained for each of those which occur in Brinkley's series, the transformation in question is accomplished; and the process, which has the appearance of considerable complexity, is singularly simplified by the self-annihilation of all its most unmanageable terms.